

- 1 -

SEQUENCE LISTING

<110> Isis Pharmaceuticals Inc.
Rosanne M. Crooke
Mark J. Graham

<120> MODULATION OF APOLIPOPROTEIN(A) EXPRESSION

<130> ISPH-0595WO

<150> 60/475,402

<151> 2003-06-02

<150> 10/684,440

<151> 2003-10-15

<160> 100

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<212> DNA

<213> H. sapiens

-2-

<220>

<221> CDS

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caa agc cat gtg gtc cag gat tgc tac cat ggt gat gga cag agt tat      153
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Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr Cys Gln Ala Trp
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tca tct atg aca cca cat caa cat aat agg acc aca gaa aac tac cca      249
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aac ctg acg caa tgc tca gac gca gaa ggg act gcc gtc gcg cct ccg      393
Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala Val Ala Pro Pro
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- 3 -

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- 4 -

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Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met	
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- 5 -

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Ser Leu Glu Ala Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly							
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Pro His Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu							
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atc atg aac tac tgc agg aat cca gat gct gtg gca gct cct tat tgt	2361						
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tat acg agg gat ccc ggt gtc agg tgg gag tac tgc aac ctg acg caa	2409						
Tyr Thr Arg Asp Pro Gly Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln							
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-6-

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Thr Pro Val Pro Ser Leu Glu Ala Pro Ser Glu Gln Ala Pro Thr Glu	
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Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro	
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-7-

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Cys Gln Ala Trp Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro			
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- 8 -

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- 9 -

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-10-

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caa agg cct ggg gtg cag gag tgc tac cat ggt aat gga cag agt tat	5625
Gln Arg Pro Gly Val Gln Glu Cys Tyr His Gly Asn Gly Gln Ser Tyr	
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Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro	
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1895 1900 1905	
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Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala Val Ala Pro Pro	
1925 1930 1935 1940	
act gtt acc ccg gtt cca agc cta gag gct cct tcc gaa caa gca ccg	5913
Thr Val Thr Pro Val Pro Ser Leu Glu Ala Pro Ser Glu Gln Ala Pro	
1945 1950 1955	
act gag caa agg cct ggg gtg cag gag tgc tac cat ggt aat gga cag	5961
Thr Glu Gln Arg Pro Gly Val Gln Glu Cys Tyr His Gly Asn Gly Gln	
1960 1965 1970	
agt tat cga ggc aca tac tcc acc act gtc aca gga aga acc tgc caa	6009
Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr Cys Gln	
1975 1980 1985	
gct tgg tca tct atg aca cca cac tcg cat agt cgg acc cca gaa tac	6057
Ala Trp Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro Glu Tyr	
1990 1995 2000	
tac cca aat gct ggc ttg atc atg aac tac tgc agg aat cca gat gct	6105
Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg Asn Pro Asp Ala	
2005 2010 2015 2020	
gtg gca gct cct tat tgt tat acg agg gat ccc ggt gtc agg tgg gag	6153
Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly Val Arg Trp Glu	
2025 2030 2035	
tac tgc aac ctg acg caa tgc tca gac gca gaa ggg act gcc gtc gcg	6201
Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala Val Ala	

-11-

2040										2045					2050					
cct	ccg	act	gtt	acc	ccg	gtt	cca	agc	cta	gag	gct	cct	tcc	gaa	caa		6249			
Pro	Pro	Thr	Val	Thr	Pro	Val	Pro	Ser	Leu	Glu	Ala	Pro	Ser	Glu	Gln					
2055					2060					2065										
gca	ccg	act	gag	caa	agg	cct	ggg	gtg	cag	gag	tgc	tac	cat	ggg	aat		6297			
Ala	Pro	Thr	Glu	Gln	Arg	Pro	Gly	Val	Gln	Glu	Cys	Tyr	His	Gly	Asn					
2070					2075					2080										
gga	cag	agt	tat	cga	ggc	aca	tac	tcc	acc	act	gtc	aca	gga	aga	acc		6345			
Gly	Gln	Ser	Tyr	Arg	Gly	Thr	Tyr	Ser	Thr	Thr	Val	Thr	Gly	Arg	Thr					
2085					2090					2095					2100					
tgc	caa	gct	tgg	tca	tct	atg	aca	cca	cac	tcg	cat	agt	cgg	acc	cca		6393			
Cys	Gln	Ala	Trp	Ser	Ser	Met	Thr	Pro	His	Ser	His	Ser	Arg	Thr	Pro					
2105					2110					2115										
gaa	tac	tac	cca	aat	gct	ggc	ttg	atc	atg	aac	tac	tgc	agg	aat	cca		6441			
Glu	Tyr	Tyr	Pro	Asn	Ala	Gly	Leu	Ile	Met	Asn	Tyr	Cys	Arg	Asn	Pro					
2120					2125					2130										
gat	gct	gtg	gca	gct	cct	tat	tgt	tat	acg	agg	gat	ccc	ggg	gtc	agg		6489			
Asp	Ala	Val	Ala	Ala	Pro	Tyr	Cys	Tyr	Thr	Arg	Asp	Pro	Gly	Val	Arg					
2135					2140					2145										
tgg	gag	tac	tgc	aac	ctg	acg	caa	tgc	tca	gac	gca	gaa	ggg	act	gcc		6537			
Trp	Glu	Tyr	Cys	Asn	Leu	Thr	Gln	Cys	Ser	Asp	Ala	Glu	Gly	Thr	Ala					
2150					2155					2160										
gtc	gcg	cct	ccg	act	gtt	acc	ccg	gtt	cca	agc	cta	gag	gct	cct	tcc		6585			
Val	Ala	Pro	Pro	Thr	Val	Thr	Pro	Val	Pro	Ser	Leu	Glu	Ala	Pro	Ser					
2165					2170					2175					2180					
gaa	caa	gca	ccg	act	gag	caa	agg	cct	ggg	gtg	cag	gag	tgc	tac	cat		6633			
Glu	Gln	Ala	Pro	Thr	Glu	Gln	Arg	Pro	Gly	Val	Gln	Glu	Cys	Tyr	His					
2185					2190					2195										
ggg	aat	gga	cag	agt	tat	cga	ggc	aca	tac	tcc	acc	act	gtc	aca	gga		6681			
Gly	Asn	Gly	Gln	Ser	Tyr	Arg	Gly	Thr	Tyr	Ser	Thr	Thr	Val	Thr	Gly					
2200					2205					2210										
aga	acc	tgc	caa	gct	tgg	tca	tct	atg	aca	cca	cac	tcg	cat	agt	cgg		6729			
Arg	Thr	Cys	Gln	Ala	Trp	Ser	Ser	Met	Thr	Pro	His	Ser	His	Ser	Arg					
2215					2220					2225										
acc	cca	gaa	tac	tac	cca	aat	gct	ggc	ttg	atc	atg	aac	tac	tgc	agg		6777			
Thr	Pro	Glu	Tyr	Tyr	Pro	Asn	Ala	Gly	Leu	Ile	Met	Asn	Tyr	Cys	Arg					
2230					2235					2240										
aat	cca	gat	gct	gtg	gca	gct	cct	tat	tgt	tat	acg	agg	gat	ccc	ggg		6825			
Asn	Pro	Asp	Ala	Val	Ala	Ala	Pro	Tyr	Cys	Tyr	Thr	Arg	Asp	Pro	Gly					
2245					2250					2255					2260					
gtc	agg	tgg	gag	tac	tgc	aac	ctg	acg	caa	tgc	tca	gac	gca	gaa	ggg		6873			
Val	Arg	Trp	Glu	Tyr	Cys	Asn	Leu	Thr	Gln	Cys	Ser	Asp	Ala	Glu	Gly					
2265					2270					2275										

-12-

act gcc gtc gcg cct ccg act gtt acc ccg gtt cca agc cta gag gct	6921
Thr Ala Val Ala Pro Pro Thr Val Thr Pro Val Pro Ser Leu Glu Ala	
2280 2285 2290	
cct tcc gaa caa gca ccg act gag caa agg cct ggg gtg cag gag tgc	6969
Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly Val Gln Glu Cys	
2295 2300 2305	
tac cat ggt aat gga cag agt tat cga ggc aca tac tcc acc act gtc	7017
Tyr His Gly Asn Gly Gln Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val	
2310 2315 2320	
aca gga aga acc tgc caa gct tgg tca tct atg aca cca cac tcg cat	7065
Thr Gly Arg Thr Cys Gln Ala Trp Ser Ser Met Thr Pro His Ser His	
2325 2330 2335 2340	
agt cgg acc cca gaa tac tac cca aat gct ggc ttg atc atg aac tac	7113
Ser Arg Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr	
2345 2350 2355	
tgc agg aat cca gat gct gtg gca gct cct tat tgt tat acg agg gat	7161
Cys Arg Asn Pro Asp Ala Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp	
2360 2365 2370	
ccc ggt gtc agg tgg gag tac tgc aac ctg acg caa tgc tca gac gca	7209
Pro Gly Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala	
2375 2380 2385	
gaa ggg act gcc gtc gcg cct ccg act gtt acc ccg gtt cca agc cta	7257
Glu Gly Thr Ala Val Ala Pro Pro Thr Val Thr Pro Val Pro Ser Leu	
2390 2395 2400	
gag gct cct tcc gaa caa gca ccg act gag caa agg cct ggg gtg cag	7305
Glu Ala Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly Val Gln	
2405 2410 2415 2420	
gag tgc tac cat ggt aat gga cag agt tat cga ggc aca tac tcc acc	7353
Glu Cys Tyr His Gly Asn Gly Gln Ser Tyr Arg Gly Thr Tyr Ser Thr	
2425 2430 2435	
act gtc aca gga aga acc tgc caa gct tgg tca tct atg aca cca cac	7401
Thr Val Thr Gly Arg Thr Cys Gln Ala Trp Ser Ser Met Thr Pro His	
2440 2445 2450	
tcg cat agt cgg acc cca gaa tac tac cca aat gct ggc ttg atc atg	7449
Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met	
2455 2460 2465	
aac tac tgc agg aat cca gat gct gtg gca gct cct tat tgt tat acg	7497
Asn Tyr Cys Arg Asn Pro Asp Ala Val Ala Ala Pro Tyr Cys Tyr Thr	
2470 2475 2480	
agg gat ccc ggt gtc agg tgg gag tac tgc aac ctg acg caa tgc tca	7545
Arg Asp Pro Gly Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser	
2485 2490 2495 2500	
gac gca gaa ggg act gcc gtc gcg cct ccg act gtt acc ccg gtt cca	7593
Asp Ala Glu Gly Thr Ala Val Ala Pro Pro Thr Val Thr Pro Val Pro	

-13-

	2505	2510	2515	
agc cta gag gct cct tcc gaa caa gca ccg act gag caa agg cct ggg				7641
Ser Leu Glu Ala Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly				
	2520	2525	2530	
gtg cag gag tgc tac cat ggt aat gga cag agt tat cga ggc aca tac				7689
Val Gln Glu Cys Tyr His Gly Asn Gly Gln Ser Tyr Arg Gly Thr Tyr				
	2535	2540	2545	
tcc acc act gtc aca gga aga acc tgc caa gct tgg tca tct atg aca				7737
Ser Thr Thr Val Thr Gly Arg Thr Cys Gln Ala Trp Ser Ser Met Thr				
	2550	2555	2560	
cca cac tcg cat agt cgg acc cca gaa tac tac cca aat gct ggc ttg				7785
Pro His Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu				
	2565	2570	2575	2580
atc atg aac tac tgc agg aat cca gat gct gtg gca gct cct tat tgt				7833
Ile Met Asn Tyr Cys Arg Asn Pro Asp Ala Val Ala Ala Pro Tyr Cys				
	2585	2590	2595	
tat acg agg gat ccc ggt gtc agg tgg gag tac tgc aac ctg acg caa				7881
Tyr Thr Arg Asp Pro Gly Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln				
	2600	2605	2610	
tgc tca gac gca gaa ggg act gcc gtc gcg cct ccg act gtt acc ccg				7929
Cys Ser Asp Ala Glu Gly Thr Ala Val Ala Pro Pro Thr Val Thr Pro				
	2615	2620	2625	
gtt cca agc cta gag gct cct tcc gaa caa gca ccg act gag cag agg				7977
Val Pro Ser Leu Glu Ala Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg				
	2630	2635	2640	
cct ggg gtg cag gag tgc tac cac ggt aat gga cag agt tat cga ggc				8025
Pro Gly Val Gln Glu Cys Tyr His Gly Asn Gly Gln Ser Tyr Arg Gly				
	2645	2650	2655	2660
aca tac tcc acc act gtc act gga aga acc tgc caa gct tgg tca tct				8073
Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr Cys Gln Ala Trp Ser Ser				
	2665	2670	2675	
atg aca cca cac tcg cat agt cgg acc cca gaa tac tac cca aat gct				8121
Met Thr Pro His Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro Asn Ala				
	2680	2685	2690	
ggc ttg atc atg aac tac tgc agg aat cca gat gct gtg gca gct cct				8169
Gly Leu Ile Met Asn Tyr Cys Arg Asn Pro Asp Ala Val Ala Ala Pro				
	2695	2700	2705	
tat tgt tat acg agg gat ccc ggt gtc agg tgg gag tac tgc aac ctg				8217
Tyr Cys Tyr Thr Arg Asp Pro Gly Val Arg Trp Glu Tyr Cys Asn Leu				
	2710	2715	2720	
acg caa tgc tca gac gca gaa ggg act gcc gtc gcg cct ccg act gtt				8265
Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala Val Ala Pro Pro Thr Val				
	2725	2730	2735	2740

-14-

acc ccg gtt cca agc cta gag gct cct tcc gaa caa gca ccg act gag	8313
Thr Pro Val Pro Ser Leu Glu Ala Pro Ser Glu Gln Ala Pro Thr Glu	
2745 2750 2755	
caa agg cct ggg gtg cag gag tgc tac cat ggt aat gga cag agt tat	8361
Gln Arg Pro Gly Val Gln Glu Cys Tyr His Gly Asn Gly Gln Ser Tyr	
2760 2765 2770	
cga ggc aca tac tcc acc act gtc aca gga aga acc tgc caa gct tgg	8409
Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr Cys Gln Ala Trp	
2775 2780 2785	
tca tct atg aca cca cac tcg cat agt cgg acc cca gaa tac tac cca	8457
Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro	
2790 2795 2800	
aat gct ggc ttg atc atg aac tac tgc agg aat cca gat gct gtg gca	8505
Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg Asn Pro Asp Ala Val Ala	
2805 2810 2815 2820	
gct cct tat tgt tat acg agg gat ccc ggt gtc agg tgg gag tac tgc	8553
Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly Val Arg Trp Glu Tyr Cys	
2825 2830 2835	
aac ctg acg caa tgc tca gac gca gaa ggg act gcc gtc gcg cct ccg	8601
Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala Val Ala Pro Pro	
2840 2845 2850	
act gtt acc ccg gtt cca agc cta gag gct cct tcc gaa caa gca ccg	8649
Thr Val Thr Pro Val Pro Ser Leu Glu Ala Pro Ser Glu Gln Ala Pro	
2855 2860 2865	
act gag caa agg cct ggg gtg cag gag tgc tac cat ggt aat gga cag	8697
Thr Glu Gln Arg Pro Gly Val Gln Glu Cys Tyr His Gly Asn Gly Gln	
2870 2875 2880	
agt tat cga ggc aca tac tcc acc act gtc aca gga aga acc tgc caa	8745
Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr Cys Gln	
2885 2890 2895 2900	
gct tgg tca tct atg aca cca cac tcg cat agt cgg acc cca gaa tac	8793
Ala Trp Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro Glu Tyr	
2905 2910 2915	
tac cca aat gct ggc ttg atc atg aac tac tgc agg aat cca gat gct	8841
Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg Asn Pro Asp Ala	
2920 2925 2930	
gtg gca gct cct tat tgt tat acg agg gat ccc ggt gtc agg tgg gag	8889
Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly Val Arg Trp Glu	
2935 2940 2945	
tac tgc aac ctg acg caa tgc tca gac gca gaa ggg act gcc gtc gcg	8937
Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala Val Ala	
2950 2955 2960	
cct ccg act gtt acc ccg gtt cca agc cta gag gct cct tcc gaa caa	8985
Pro Pro Thr Val Thr Pro Val Pro Ser Leu Glu Ala Pro Ser Glu Gln	

-15-

2965	2970	2975	2980	
gca ccg act gag cag agg cct ggg gtg cag gag tgc tac cac ggt aat				9033
Ala Pro Thr Glu Gln Arg Pro Gly Val Gln Glu Cys Tyr His Gly Asn				
	2985	2990	2995	
gga cag agt tat cga ggc aca tac tcc acc act gtc act gga aga acc				9081
Gly Gln Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr				
	3000	3005	3010	
tgc caa gct tgg tca tct atg aca cca cac tcg cat agt cgg acc cca				9129
Cys Gln Ala Trp Ser Ser Met Thr Pro His Ser His Ser Arg Thr Pro				
	3015	3020	3025	
gaa tac tac cca aat gct ggc ttg atc atg aac tac tgc agg aat cca				9177
Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg Asn Pro				
	3030	3035	3040	
gat gct gtg gca gct cct tat tgt tat acg agg gat ccc ggt gtc agg				9225
Asp Ala Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly Val Arg				
	3045	3050	3055	3060
tgg gag tac tgc aac ctg acg caa tgc tca gac gca gaa ggg act gcc				9273
Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly Thr Ala				
	3065	3070	3075	
gtc gcg cct ccg act gtt acc ccg gtt cca agc cta gag gct cct tcc				9321
Val Ala Pro Thr Val Thr Pro Val Pro Ser Leu Glu Ala Pro Ser				
	3080	3085	3090	
gaa caa gca ccg act gag cag agg cct ggg gtg cag gag tgc tac cac				9369
Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly Val Gln Glu Cys Tyr His				
	3095	3100	3105	
ggt aat gga cag agt tat cga ggc aca tac tcc acc act gtc act gga				9417
Gly Asn Gly Gln Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val Thr Gly				
	3110	3115	3120	
aga acc tgc caa gct tgg tca tct atg aca cca cac tcg cat agt cgg				9465
Arg Thr Cys Gln Ala Trp Ser Ser Met Thr Pro His Ser His Ser Arg				
	3125	3130	3135	3140
acc cca gaa tac tac cca aat gct ggc ttg atc atg aac tac tgc agg				9513
Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr Cys Arg				
	3145	3150	3155	
aat cca gat gct gtg gca gct cct tat tgt tat acg agg gat ccc ggt				9561
Asn Pro Asp Ala Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp Pro Gly				
	3160	3165	3170	
gtc agg tgg gag tac tgc aac ctg acg caa tgc tca gac gca gaa ggg				9609
Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala Glu Gly				
	3175	3180	3185	
act gcc gtc gcg cct ccg act gtt acc ccg gtt cca agc cta gag gct				9657
Thr Ala Val Ala Pro Pro Thr Val Thr Pro Val Pro Ser Leu Glu Ala				
	3190	3195	3200	

-16-

cct tcc gaa caa gca ccg act gag cag agg cct ggg gtg cag gag tgc	9705
Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly Val Gln Glu Cys	
3205 3210 3215 3220	
tac cac ggt aat gga cag agt tat cga ggc aca tac tcc acc act gtc	9753
Tyr His Gly Asn Gly Gln Ser Tyr Arg Gly Thr Tyr Ser Thr Thr Val	
3225 3230 3235	
act gga aga acc tgc caa gct tgg tca tct atg aca cca cac tcg cat	9801
Thr Gly Arg Thr Cys Gln Ala Trp Ser Ser Met Thr Pro His Ser His	
3240 3245 3250	
agt cgg acc cca gaa tac tac cca aat gct ggc ttg atc atg aac tac	9849
Ser Arg Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met Asn Tyr	
3255 3260 3265	
tgc agg aat cca gat gct gtg gca gct cct tat tgt tat acg agg gat	9897
Cys Arg Asn Pro Asp Ala Val Ala Ala Pro Tyr Cys Tyr Thr Arg Asp	
3270 3275 3280	
ccc ggt gtc agg tgg gag tac tgc aac ctg acg caa tgc tca gac gca	9945
Pro Gly Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser Asp Ala	
3285 3290 3295 3300	
gaa ggg act gcc gtc gcg cct ccg act gtt acc ccg gtt cca agc cta	9993
Glu Gly Thr Ala Val Ala Pro Pro Thr Val Thr Pro Val Pro Ser Leu	
3305 3310 3315	
gag gct cct tcc gaa caa gca ccg act gag cag agg cct ggg gtg cag	10041
Glu Ala Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly Val Gln	
3320 3325 3330	
gag tgc tac cac ggt aat gga cag agt tat cga ggc aca tac tcc acc	10089
Glu Cys Tyr His Gly Asn Gly Gln Ser Tyr Arg Gly Thr Tyr Ser Thr	
3335 3340 3345	
act gtc act gga aga acc tgc caa gct tgg tca tct atg aca cca cac	10137
Thr Val Thr Gly Arg Thr Cys Gln Ala Trp Ser Ser Met Thr Pro His	
3350 3355 3360	
tcg cat agt cgg acc cca gaa tac tac cca aat gct ggc ttg atc atg	10185
Ser His Ser Arg Thr Pro Glu Tyr Tyr Pro Asn Ala Gly Leu Ile Met	
3365 3370 3375 3380	
aac tac tgc agg aat cca gat cct gtg gca gcc cct tat tgt tat acg	10233
Asn Tyr Cys Arg Asn Pro Asp Pro Val Ala Ala Pro Tyr Cys Tyr Thr	
3385 3390 3395	
agg gat ccc agt gtc agg tgg gag tac tgc aac ctg aca caa tgc tca	10281
Arg Asp Pro Ser Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln Cys Ser	
3400 3405 3410	
gac gca gaa ggg act gcc gtc gcg cct cca act att acc ccg att cca	10329
Asp Ala Glu Gly Thr Ala Val Ala Pro Pro Thr Ile Thr Pro Ile Pro	
3415 3420 3425	
agc cta gag gct cct tct gaa caa gca cca act gag caa agg cct ggg	10377
Ser Leu Glu Ala Pro Ser Glu Gln Ala Pro Thr Glu Gln Arg Pro Gly	

-17-

3430	3435	3440	
gtg cag gag tgc tac cac gga aat gga cag agt tat caa ggc aca tac			10425
Val Gln Glu Cys Tyr His Gly Asn Gly Gln Ser Tyr Gln Gly Thr Tyr			
3445	3450	3455	3460
ttc att act gtc aca gga aga acc tgc caa gct tgg tca tct atg aca			10473
Phe Ile Thr Val Thr Gly Arg Thr Cys Gln Ala Trp Ser Ser Met Thr			
3465	3470		3475
cca cac tcg cat agt cgg acc cca gca tac tac cca aat gct ggc ttg			10521
Pro His Ser His Ser Arg Thr Pro Ala Tyr Tyr Pro Asn Ala Gly Leu			
3480	3485		3490
atc aag aac tac tgc cga aat cca gat cct gtg gca gcc cct tgg tgt			10569
Ile Lys Asn Tyr Cys Arg Asn Pro Asp Pro Val Ala Ala Pro Trp Cys			
3495	3500		3505
tat aca aca gat ccc agt gtc agg tgg gag tac tgc aac ctg aca cga			10617
Tyr Thr Thr Asp Pro Ser Val Arg Trp Glu Tyr Cys Asn Leu Thr Arg			
3510	3515		3520
tgc tca gat gca gaa tgg act gcc ttc gtc cct ccg aat gtt att ctg			10665
Cys Ser Asp Ala Glu Trp Thr Ala Phe Val Pro Pro Asn Val Ile Leu			
3525	3530		3540
gct cca agc cta gag gct ttt ttt gaa caa gca ctg act gag gaa acc			10713
Ala Pro Ser Leu Glu Ala Phe Phe Glu Gln Ala Leu Thr Glu Glu Thr			
3545	3550		3555
ccc ggg gta cag gac tgc tac tac cat tat gga cag agt tac cga ggc			10761
Pro Gly Val Gln Asp Cys Tyr Tyr His Tyr Gly Gln Ser Tyr Arg Gly			
3560	3565		3570
aca tac tcc acc act gtc aca gga aga act tgc caa gct tgg tca tct			10809
Thr Tyr Ser Thr Thr Val Thr Gly Arg Thr Cys Gln Ala Trp Ser Ser			
3575	3580		3585
atg aca cca cac cag cat agt cgg acc cca gaa aac tac cca aat gct			10857
Met Thr Pro His Gln His Ser Arg Thr Pro Glu Asn Tyr Pro Asn Ala			
3590	3595		3600
ggc ctg acc agg aac tac tgc agg aat cca gat gct gag att cgc cct			10905
Gly Leu Thr Arg Asn Tyr Cys Arg Asn Pro Asp Ala Glu Ile Arg Pro			
3605	3610		3620
tgg tgt tac acc atg gat ccc agt gtc agg tgg gag tac tgc aac ctg			10953
Trp Cys Tyr Thr Met Asp Pro Ser Val Arg Trp Glu Tyr Cys Asn Leu			
3625	3630		3635
aca caa tgc ctg gtg aca gaa tca agt gtc ctt gca act ctc acg gtg			11001
Thr Gln Cys Leu Val Thr Glu Ser Ser Val Leu Ala Thr Leu Thr Val			
3640	3645		3650
gtc cca gat cca agc aca gag gct tct tct gaa gaa gca cca acg gag			11049
Val Pro Asp Pro Ser Thr Glu Ala Ser Ser Glu Glu Ala Pro Thr Glu			
3655	3660		3665

-18-

caa agc ccc ggg gtc cag gat tgc tac cat ggt gat gga cag agt tat	11097
Gln Ser Pro Gly Val Gln Asp Cys Tyr His Gly Asp Gly Gln Ser Tyr	
3670 3675 3680	
cga ggc tca ttc tct acc act gtc aca gga agg aca tgt cag tct tgg	11145
Arg Gly Ser Phe Ser Thr Thr Val Thr Gly Arg Thr Cys Gln Ser Trp	
3685 3690 3695 3700	
tcc tct atg aca cca cac tgg cat cag agg aca aca gaa tat tat cca	11193
Ser Ser Met Thr Pro His Trp His Gln Arg Thr Thr Glu Tyr Tyr Pro	
3705 3710 3715	
aat ggt ggc ctg acc agg aac tac tgc agg aat cca gat gct gag att	11241
Asn Gly Gly Leu Thr Arg Asn Tyr Cys Arg Asn Pro Asp Ala Glu Ile	
3720 3725 3730	
agt cct tgg tgt tat acc atg gat ccc aat gtc aga tgg gag tac tgc	11289
Ser Pro Trp Cys Tyr Thr Met Asp Pro Asn Val Arg Trp Glu Tyr Cys	
3735 3740 3745	
aac ctg aca caa tgt cca gtg aca gaa tca agt gtc ctt gcg acg tcc	11337
Asn Leu Thr Gln Cys Pro Val Thr Glu Ser Ser Val Leu Ala Thr Ser	
3750 3755 3760	
acg gct gtt tct gaa caa gca cca acg gag caa agc ccc aca gtc cag	11385
Thr Ala Val Ser Glu Gln Ala Pro Thr Glu Gln Ser Pro Thr Val Gln	
3765 3770 3775 3780	
gac tgc tac cat ggt gat gga cag agt tat cga ggc tca ttc tcc acc	11433
Asp Cys Tyr His Gly Asp Gly Gln Ser Tyr Arg Gly Ser Phe Ser Thr	
3785 3790 3795	
act gtt aca gga agg aca tgt cag tct tgg tcc tct atg aca cca cac	11481
Thr Val Thr Gly Arg Thr Cys Gln Ser Trp Ser Ser Met Thr Pro His	
3800 3805 3810	
tgg cat cag aga acc aca gaa tac tac cca aat ggt ggc ctg acc agg	11529
Trp His Gln Arg Thr Thr Glu Tyr Tyr Pro Asn Gly Gly Leu Thr Arg	
3815 3820 3825	
aac tac tgc agg aat cca gat gct gag att cgc cct tgg tgt tat acc	11577
Asn Tyr Cys Arg Asn Pro Asp Ala Glu Ile Arg Pro Trp Cys Tyr Thr	
3830 3835 3840	
atg gat ccc agt gtc aga tgg gag tac tgc aac ctg acg caa tgt cca	11625
Met Asp Pro Ser Val Arg Trp Glu Tyr Cys Asn Leu Thr Gln Cys Pro	
3845 3850 3855 3860	
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Val Met Glu Ser Thr Leu Leu Thr Thr Pro Thr Val Val Pro Val Pro	
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agc aca gag ctt cct tct gaa gaa gca cca act gaa aac agc act ggg	11721
Ser Thr Glu Leu Pro Ser Glu Glu Ala Pro Thr Glu Asn Ser Thr Gly	
3880 3885 3890	
gtc cag gac tgc tac cga ggt gat gga cag agt tat cga ggc aca ctc	11769
Val Gln Asp Cys Tyr Arg Gly Asp Gly Gln Ser Tyr Arg Gly Thr Leu	

-19-

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Ser Thr Thr Ile Thr Gly Arg Thr Cys Gln Ser Trp Ser Ser Met Thr			
3910	3915	3920	
cca cat tgg cat cgg agg atc cca tta tac tat cca aat gct ggc ctg			11865
Pro His Trp His Arg Arg Ile Pro Leu Tyr Tyr Pro Asn Ala Gly Leu			
3925	3930	3935	3940
acc agg aac tac tgc agg aat cca gat gct gag att cgc cct tgg tgt			11913
Thr Arg Asn Tyr Cys Arg Asn Pro Asp Ala Glu Ile Arg Pro Trp Cys			
3945	3950	3955	
tac acc atg gat ccc agt gtc agg tgg gag tac tgc aac ctg aca cga			11961
Tyr Thr Met Asp Pro Ser Val Arg Trp Glu Tyr Cys Asn Leu Thr Arg			
3960	3965	3970	
tgt cca gtg aca gaa tcg agt gtc ctc aca act ccc aca gtg gcc ccg			12009
Cys Pro Val Thr Glu Ser Ser Val Leu Thr Thr Pro Thr Val Ala Pro			
3975	3980	3985	
gtt cca agc aca gag gct cct tct gaa caa gca cca cct gag aaa agc			12057
Val Pro Ser Thr Glu Ala Pro Ser Glu Gln Ala Pro Pro Glu Lys Ser			
3990	3995	4000	
cct gtg gtc cag gat tgc tac cat ggt gat gga cgg agt tat cga ggc			12105
Pro Val Val Gln Asp Cys Tyr His Gly Asp Gly Arg Ser Tyr Arg Gly			
4005	4010	4015	4020
ata tcc tcc acc act gtc aca gga agg acc tgt caa tct tgg tca tct			12153
Ile Ser Ser Thr Thr Val Thr Gly Arg Thr Cys Gln Ser Trp Ser Ser			
4025	4030	4035	
atg ata cca cac tgg cat cag agg acc cca gaa aac tac cca aat gct			12201
Met Ile Pro His Trp His Gln Arg Thr Pro Glu Asn Tyr Pro Asn Ala			
4040	4045	4050	
ggc ctg acc gag aac tac tgc agg aat cca gat tct ggg aaa caa ccc			12249
Gly Leu Thr Glu Asn Tyr Cys Arg Asn Pro Asp Ser Gly Lys Gln Pro			
4055	4060	4065	
tgg tgt tac aca acc gat ccg tgt gtg agg tgg gag tac tgc aat ctg			12297
Trp Cys Tyr Thr Thr Asp Pro Cys Val Arg Trp Glu Tyr Cys Asn Leu			
4070	4075	4080	
aca caa tgc tca gaa aca gaa tca ggt gtc cta gag act ccc act gtt			12345
Thr Gln Cys Ser Glu Thr Glu Ser Gly Val Leu Glu Thr Pro Thr Val			
4085	4090	4095	4100
gtt cca gtt cca agc atg gag gct cat tct gaa gca gca cca act gag			12393
Val Pro Val Pro Ser Met Glu Ala His Ser Glu Ala Ala Pro Thr Glu			
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caa acc cct gtg gtc cgg cag tgc tac cat ggt aat ggc cag agt tat			12441
Gln Thr Pro Val Val Arg Gln Cys Tyr His Gly Asn Gly Gln Ser Tyr			
4120	4125	4130	

-20-

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Arg Gly Thr Phe Ser Thr Thr Val Thr Gly Arg Thr Cys Gln Ser Trp	
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tca tcc atg aca cca cac cgg cat cag agg acc cca gaa aac tac cca	12537
Ser Ser Met Thr Pro His Arg His Gln Arg Thr Pro Glu Asn Tyr Pro	
4150 4155 4160	
aat gat ggc ctg aca atg aac tac tgc agg aat cca gat gcc gat aca	12585
Asn Asp Gly Leu Thr Met Asn Tyr Cys Arg Asn Pro Asp Ala Asp Thr	
4165 4170 4175 4180	
ggc cct tgg tgt ttt acc atg gac ccc agc atc agg tgg gag tac tgc	12633
Gly Pro Trp Cys Phe Thr Met Asp Pro Ser Ile Arg Trp Glu Tyr Cys	
4185 4190 4195	
aac ctg acg cga tgc tca gac aca gaa ggg act gtg gtc gct cct ccg	12681
Asn Leu Thr Arg Cys Ser Asp Thr Glu Gly Thr Val Val Ala Pro Pro	
4200 4205 4210	
act gtc atc cag gtt cca agc cta ggg cct cct tct gaa caa gac tgt	12729
Thr Val Ile Gln Val Pro Ser Leu Gly Pro Pro Ser Glu Gln Asp Cys	
4215 4220 4225	
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Met Phe Gly Asn Gly Lys Gly Tyr Arg Gly Lys Lys Ala Thr Thr Val	
4230 4235 4240	
act ggg acg cca tgc cag gaa tgg gct gcc cag gag ccc cat aga cac	12825
Thr Gly Thr Pro Cys Gln Glu Trp Ala Ala Gln Glu Pro His Arg His	
4245 4250 4255 4260	
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Ser Thr Phe Ile Pro Gly Thr Asn Lys Trp Ala Gly Leu Glu Lys Asn	
4265 4270 4275	
tac tgc cgt aac cct gat ggt gac atc aat ggt ccc tgg tgc tac aca	12921
Tyr Cys Arg Asn Pro Asp Gly Asp Ile Asn Gly Pro Trp Cys Tyr Thr	
4280 4285 4290	
atg aat cca aga aaa ctt ttt gac tac tgt gat atc cct ctc tgt gca	12969
Met Asn Pro Arg Lys Leu Phe Asp Tyr Cys Asp Ile Pro Leu Cys Ala	
4295 4300 4305	
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Ser Ser Ser Phe Asp Cys Gly Lys Pro Gln Val Glu Pro Lys Lys Cys	
4310 4315 4320	
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Pro Gly Ser Ile Val Gly Gly Cys Val Ala His Pro His Ser Trp Pro	
4325 4330 4335 4340	
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Trp Gln Val Ser Leu Arg Thr Arg Phe Gly Lys His Phe Cys Gly Gly	
4345 4350 4355	
acc tta ata tcc cca gag tgg gtg ctg act gct gct cac tgc ttg aag	13161
Thr Leu Ile Ser Pro Glu Trp Val Leu Thr Ala Ala His Cys Leu Lys	

-21-

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Lys Ser Ser Arg Pro Ser Ser Tyr Lys Val Ile Leu Gly Ala His Gln			
4375	4380	4385	
gaa gtg aac ctc gaa tct cat gtt cag gaa ata gaa gtg tct agg ctg			13257
Glu Val Asn Leu Glu Ser His Val Gln Glu Ile Glu Val Ser Arg Leu			
4390	4395	4400	
ttc ttg gag ccc aca caa gca gat att gcc ttg cta aag cta agc agg			13305
Phe Leu Glu Pro Thr Gln Ala Asp Ile Ala Leu Leu Lys Leu Ser Arg			
4405	4410	4415	4420
cct gcc gtc atc act gac aaa gta atg cca gct tgt ctg cca tcc cca			13353
Pro Ala Val Ile Thr Asp Lys Val Met Pro Ala Cys Leu Pro Ser Pro			
4425	4430	4435	
gac tac atg gtc acc gcc agg act gaa tgt tac atc act ggc tgg gga			13401
Asp Tyr Met Val Thr Ala Arg Thr Glu Cys Tyr Ile Thr Gly Trp Gly			
4440	4445	4450	
gaa acc caa ggt acc ttt ggg act ggc ctt ctc aag gaa gcc cag ctc			13449
Glu Thr Gln Gly Thr Phe Gly Thr Gly Leu Leu Lys Glu Ala Gln Leu			
4455	4460	4465	
ctt gtt att gag aat gaa gtg tgc aat cac tat aag tat att tgt gct			13497
Leu Val Ile Glu Asn Glu Val Cys Asn His Tyr Lys Tyr Ile Cys Ala			
4470	4475	4480	
gag cat ttg gcc aga ggc act gac agt tgc cag ggt gac agt gga ggg			13545
Glu His Leu Ala Arg Gly Thr Asp Ser Cys Gln Gly Asp Ser Gly Gly			
4485	4490	4495	4500
cct ctg gtt tgc ttc gag aag gac aaa tac att tta caa gga gtc act			13593
Pro Leu Val Cys Phe Glu Lys Asp Lys Tyr Ile Leu Gln Gly Val Thr			
4505	4510	4515	
tct tgg ggt ctt ggc tgt gca cgc ccc aat aag cct ggt gtc tat gct			13641
Ser Trp Gly Leu Gly Cys Ala Arg Pro Asn Lys Pro Gly Val Tyr Ala			
4520	4525	4530	
cgt gtt tca agg ttt gtt act tgg att gag gga atg atg aga aat aat			13689
Arg Val Ser Arg Phe Val Thr Trp Ile Glu Gly Met Met Arg Asn Asn			
4535	4540	4545	
taa ttggacggga gacagagtga agcatcaacc tacttagaag ctgaaacgtg			13742
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ggtaaggatt tagcatgctg gaaataatag acagcaatca aacgaagaca ctgttcccag			13802
ctaccagcta tgccaaacct tggcattttt ggtatttttg tgtataagct ttttaaggct			13862
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-22-

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-23-

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-24-

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-30-

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-32-

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-35-

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-36-

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-37-

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-38-

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-39-

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- 40 -

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- 41 -

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-42-

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- 43 -

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-44-

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-45-

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